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ABSTRACT

2 New methods for objective measurement of video quality using the wavelet transform are
3 provided. The characteristic of the human visual system, which varies in spatio-temporal
4 frequencies, is exploited to develop methods for objective measurement of video quality. In
5 order to compute spatial frequency components, the wavelet transform is applied to each frame
6 of source and processed videos. Then, the difference (squared error) of the wavelet coefficients
7 in each subband is computed and summed, producing a difference vector for each frame. By
8 applying this procedure to the entire frames of source and processed videos, a sequence of
9 difference vectors is obtained and the average vector is computed. Each component of this
10 average vector represents a difference in a certain spatial frequency. In order to take into
11 account the temporal frequencies, a modified 3-D wavelet transform is provided. In either case,
12 a single vector represents the difference between the source and the processed videos. From
13 this vector, a number is computed as a weighted sum of the elements of the vector and that
14 number will be used as an objective score. An optimization procedure, which finds the optimal
15 weight vector, is provided.

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